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Sir:

Transmitted herewith for filing is the original patent application of:

Inventor: Thiayagesan (nmi) Ramalingam

For: *METHOD AND SYSTEM FOR TRANSMITTING MESSAGES IN A
COMMUNICATIONS NETWORK*

Enclosed are:

Specification, Claims and Abstract (29 Total Pages).

2 sheets of formal Drawings.

Combined Declaration and Power of Attorney.

An Assignment of the invention to Cisco Technology, Inc. A separate
cover sheet in compliance with 37 C.F.R. §§ 3.28 and 3.31 is included
with an Assignment recordal fee of \$40.00 pursuant to 37 C.F.R. §
1.21(h).

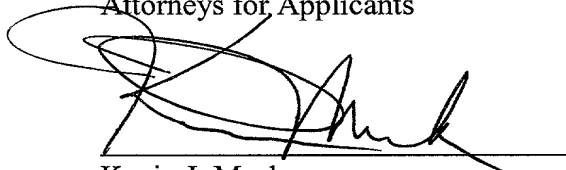
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FEE CALCULATION					FEE
	Number		Number Extra	Rate	Basic Fee \$710.00
Total Claims	36	20	16	X \$18.00 =	288.00
Independent Claims	5	3	2	X \$80.00 =	160.00
TOTAL FILING FEE =					\$1,158.00

Enclosed is a check in the amount of \$1,158.00 for filing fee. Please charge any
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Date: 10.13.00

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Thiyagesan (nmi) Ramalingam
Date Filed: October 13, 2000
Title: *METHOD AND SYSTEM FOR TRANSMITTING
MESSAGES IN A COMMUNICATIONS NETWORK*

Box Patent Application
Honorable Assistant Commissioner of
Patents
Washington, D.C. 20231

Dear Sir:

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I hereby certify that the attached Patent Application, Declaration and Power of Attorney, Assignment, Assignment Cover Sheet, two sheets of Formal Drawings, Fee Transmittal, this Certificate of Mailing and a check in the amount of \$1,158.00, and a check in the amount of \$40.00 are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. § 1.10 on this 13th day of October, 2000 and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

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METHOD AND SYSTEM FOR TRANSMITTING MESSAGES IN A
COMMUNICATIONS NETWORK

TECHNICAL FIELD OF THE INVENTION

This invention relates generally to the field of telecommunications and more specifically to a method and system for transmitting messages in a communications network.

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Messages in a communications network are often routed using a Signaling System 7 (SS7) protocol. Messages sent by a signal transfer point are received by a signaling gateway and routed to a voice gateway coupled to the signaling gateway. The signal transfer point identifies signaling gateways within the network by a point code that is configured in the signaling gateway. Each new voice gateway requires an additional signaling gateway through which messages are routed, and the signal transfer point is then reconfigured to recognize the new signaling gateway. Such reconfiguration, however, is time-consuming and prone to error.

SUMMARY OF THE INVENTION

A method and system for transmitting messages in a communications network is disclosed. A signaling gateway receives a message directed to a destination circuit. Multiple voice gateways, which include a destination voice gateway coupled to the destination circuit, are coupled to the signaling gateway. Circuits, including the destination circuit, are coupled to the voice gateways. The signaling gateway determines the destination voice gateway and sends the message to the destination voice gateway.

A signaling gateway for transmitting a message in a communications network is disclosed. A signaling software stack receives a message directed to a destination circuit, and determines a destination voice gateway coupled to the destination circuit. The destination voice gateway is one of a number of voice gateways coupled to the signaling gateway. A message direction part appends a header to the message. The header includes a voice gateway address that identifies the destination voice gateway.

A technical advantage of one embodiment of the system is that multiple voice gateways are coupled to a single signaling gateway. Additional voice gateways may be coupled to the signaling gateway without adding more signaling gateways. Another technical advantage is that a switch coupled to the signaling gateway does not need to be reconfigured when an additional voice gateway is coupled to the signaling gateway.

Another technical advantage is that backing up the system does not require creating a redundant set of voice gateways coupled to the backup signaling gateway.

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DETAILED DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a block diagram of one embodiment of a system 2 for transmitting a message in a communications network. System 2 sets up communication sessions and directs signals in the communications network. Communications may include one or a combination of voice, video, audio, data or other communications. Any suitable protocol may be used in system 2. Because Signaling System 7 (SS7) protocol is typically used as a protocol for voice transfer, terms from the SS7 protocol are used in the following description, but it is understood that the invention could apply to equivalent structures using any appropriate protocol that provide services for directing or establishing communications or otherwise manage components in system 2.

A communications network, which includes system 2, includes one or a combination of a public switched telephone network (PSTN), a public/private communications network, a wireline/wireless network, a local, regional, or global communications network, and/or other suitable circuit-switched or packet based communications network. System 2 includes a switch 10, which may be a central office, end office, or other facility providing communications services. Switch 10 is coupled to a signal transfer point (STP) 20, which transfers signaling messages from one signaling link to another. Signal transfer point 20 is coupled to a signaling gateway (SG) 32 through a communication path 14 of the communications network.

Signal transfer point 20 is configured to recognize signaling gateway 32 by assigning a gateway identifier, for example, a 24-bit point code, to signaling gateway

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transmission control protocol/Internet protocol (TCP/IP), the address of each voice gateway 34 is an IP address. Each voice gateway 34 is coupled to a number of circuits 62 that provide a variety of voice, video, and/or data services. "Each" refers to each of a set or each of a subset of the set. Signaling gateway 32 determines which voice gateway 34 is associated with circuits 62 so that a message directed to a particular circuit 62 can be routed to the proper voice gateway 34. A memory 33 coupled to signaling gateway 32 stores a hash table 70 that provides information for determining the voice gateway 34. This recognition and routing process is described in greater detail in conjunction with FIGURES 3 and 4.

In operation, before switch 10 sends messages to a circuit 62, switch 10 verifies that circuit 62 is available to receive messages by sending an initial address message (IAM) to determine whether the circuit 62 is available for connection, or a keepalive packet to verify that circuit 62 is still responding. The initial address message seizes circuit 62 and provides information relating to the handling of the call. After determining availability, switch 10 sends a message. The message includes a header indicating a destination circuit 62 to which the message is directed, which is determined by the destination of the message, for example, a telephone number dialed by a caller. Signal transfer point 20 determines destination circuit 62 and sends the message to signaling gateway 32 associated with destination circuit 62.

Signaling gateway 32 receives the message, determines a destination voice gateway 34 coupled to the destination circuit 62, and sends the message to

destination voice gateway 34. Several embodiments allow signaling gateway 32 to perform these tasks. Such embodiments are described in greater detail in conjunction with FIGURES 3 and 4. Voice gateway 34 receives the message, directs the message to the appropriate circuit 62 if possible, and replies to switch 10 if the message invites a response.

One embodiment of the single point code architecture presents several technical advantages. Signal transfer point 20 does not have to be reconfigured every time a new voice gateway 34 is added to signaling point 30 because signaling gateway 32, which is already recognized by signal transfer point 20, can accommodate the added voice gateway 34. The added voice gateway 34, on the other hand, can readily be reprogrammed by simply downloading software from the signaling gateway 32, reducing system failures due to errors in complicated reconfiguration processes. Additionally, system 2 is readily scalable because installing a new voice gateway 34 does not require adding another signaling gateway 32.

Furthermore, a single point code architecture dramatically reduces the complexity of the backup system. Backup systems are crucial for efficient operation of communications networks. In a multi-point code architecture, where each voice gateway requires its own signaling gateway, backing up the system requires complete replication of signaling point 30 as well as reconfiguration of signal transfer point 20 to recognize the backup system. In a single point code architecture, each component does not need to be replicated individually, thus reducing complexity of the backup systems. For example, if signaling gateway 32 fails, a

backup signaling gateway 38 can take over by assuming the operations of the original signaling gateway 32 in the communications protocol. Backup signaling gateway 38 does not require redundant voice gateways 34 that go unused when the backup system is not being used. Instead, signaling gateway 32 can simply assume management of existing voice gateways 34. Similarly, a new voice gateway 34 can efficiently be put in place of another voice gateway 34 in the communications protocol if one of the voice gateways 34 fail.

FIGURE 2 illustrates one embodiment of message processing between signaling gateway 32 and voice gateways 34 of FIGURE 1. In one embodiment, a message is typically routed using one or more message transfer parts (MTPs), which provide processing for routing of messages between signaling points. A user protocol, such as an integrated services digital network (ISDN) user part (ISUP), which provides call setup signaling information between signaling points, may also be used. In multi-point code architectures, the signaling gateway executes all of the protocols. That is, message processing is localized at the signaling gateway. System 2, however, contemplates the use of any suitable messaging or signaling protocol. FIGURE 2 illustrates how processing is distributed among signaling gateway 32 and voice gateways 34 in a single point code architecture.

In one embodiment, signaling gateway 32 receives a message. Signaling gateway 32 processes the message using a signaling software stack 41. Signaling software stack 41 identifies the destination circuit 62 to which a message is directed, and determines the destination voice gateway 34 coupled to the destination circuit 62. A hash

table 70 in memory 33, which is described in connection with FIGURE 3, may be used to associate the destination voice gateway 34 with the destination circuit 62.

Signaling software stack 41 typically includes three message transfer parts, MTP1 42, MTP2 44, and MTP3 46. The message terminates on each part, that is, the message arrives at an MTP and is directed to another part. For example, MTP1 42 manages a collection of physical circuits, MTP2 44 manages multiple MTP1s 42, and MTP3 46 manages multiple MTP2s 44. A message arriving from a physical circuit terminates on MTP1 42. MTP1 42 redirects the message to an MTP2 44, and MTP2 44 redirects the message to an MTP3 66. System 2, however, contemplates any level or combination of MTPs.

MTP3 46 of signaling gateway 32 transmits the message to a message direction part 48. Message direction part 48 may append a header to the message, as described in connection with FIGURE 4, or may direct the message using a protocol such as signal control transfer protocol (SCTP). SCTP permits the message to be routed by circuit number without having to convert the circuit number to an IP address, thus saving a processing step. The message is sent to call control 50, which routes the message to the appropriate voice gateway 34 in a manner according to the communications protocol.

Voice gateway 34 receives the message and processes the message in a message processing part 52. In message processing part 52, voice gateway 34 may send the message to distribution circuit 62, edit the message to remove a header, generate a responding message for switch 10, or perform other functions relating to the availability of circuits 62 or the transmission of messages to circuits

62. Voice gateway 34 processes the message through a user part 54, for example, an ISDN user part (ISUP). User part 54 may direct setting up, coordinating, and terminating calls in system 2. User part 54 sends the message to a circuit 62.

The division of MTP1, 42, MTP2 44, MTP3 46, and user part 54 between signaling gateway 32 and voice gateways 34 demonstrates how standard message processing may be distributed within a single point code architecture. System 2 contemplates any distribution of processing between signaling gateway 32 and voice gateways 34 or all processing at signaling gateway 32 or all processing at voice gateway 34.

FIGURES 3 and 4 illustrate how signaling gateway 32 may interact with multiple voice gateways 34. FIGURE 3 illustrates a hash table 70 that signaling gateway 32 may use to determine the particular voice gateway 34 to which a message is directed. FIGURE 4 illustrates a header 80 that may be appended to a message directed to a destination voice gateway 34.

In one embodiment, signaling software stack 41 of signaling gateway 32 accesses a hash table 70 stored in memory 33. When signaling gateway 32 receives a message directed to circuit 62, signaling software stock 41 uses hash table 70 to determine the address for the proper destination voice gateway 34 that manages and is coupled to destination circuit 62. Hash table 70 associates a circuit identifier 72 of destination circuit 62 with a voice gateway address 76 of destination voice gateway 34 coupled to destination circuit 62. Circuit identifier 72 may include a circuit number, and a voice gateway address 76 may include an IP address. Hash table 70 also

associates circuit identifier 72 with a signaling gateway identifier 74, for example, a point code of a signaling gateway 32 that can access destination circuit 62. Signaling gateway identifier 74 may be used to verify that destination circuit 62 is accessible by the signaling gateway 32 that is processing the message in order to check that the message has been sent to the correct signaling gateway 32.

Once signaling gateway 32 has the proper voice gateway address 76, the message direction part 48 appends header 80, an example is illustrated in FIGURE 4, to the message in order to allow the message to be directed by the communications protocol. The message includes content 78 and header 80 that routes the message through system 2. Header 80 includes circuit identifier 72 and signaling gateway address 82. Signaling gateway address 82 may include an IP address of signaling gateway 32.

Header 80 also includes a sender identifier 84 for the sender of the message so that voice gateway 34 can direct responses to the sender using the communications protocol. The sender may include signal transfer point 20 or switch 10. Sender identifier 84 may include a point code for the sender. Header 80 also includes a keepalive bit 86 that instructs voice gateway 34 whether to send a keepalive response to prevent disconnection with switch 10. For example, the signaling-keepalive bit 86 may be set to "zero" if the voice gateway 32 needs to send a keepalive response to the switch 10 to maintain the connection, and "one" if no response is required, or vice versa.

Hash table 70 and headers 80 allow signaling gateway 32 to direct messages to voice gateways 34. Alternative

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of destination voice gateway 34 that manages destination circuit 62 at step 114. Signaling software stack 41 may look up voice gateway address 76 using hash table 70 that associates circuit identifier 72 with voice gateway address 76. Message direction part 48 appends header 80 to the message at step 116. Header 80 includes circuit identifier 72 of destination circuit 62, signaling gateway address 82, sender identifier 84, and keepalive bit 86. After header 80 is appended, call control 50 routes the message to destination voice gateway 34 at step 118. Call control 50 may use TCP/IP communication protocol to send the message.

Destination voice gateway 34 receives the message at step 120. At step 122, destination voice gateway 34 determines whether a keepalive response is required in order to maintain the communication link based on the value assigned to keepalive bit 86. For example, keepalive bit 86 is "zero" if a keepalive response is required and "one" if a keepalive response is not required. If a keepalive response is required at step 122, the method proceeds to step 124, where voice gateway 34 sends a keepalive response to signaling gateway 32. The method then proceeds to step 126. If a keepalive response is not required at step 122, the method proceeds directly to step 126.

At step 126, voice gateway 34 directs the message to destination circuit 62. Voice gateway 34 may perform additional processing, for example, generating a response to the message or other processing appropriate to the message. Destination circuit 62 sends the message to external network 60 at step 128. After the message is sent, the method terminates.

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Variable	Mean	SD	Min	Max
Age (years)	38.5	12.5	18	65
Gender (male/female)	15/15			
Marital status (married/divorced/separated)	10/5/5			
Education (years)	12.5	2.5	8	16
Occupation (unemployed/employed)	10/5			
Income (USD/month)	1500	500	500	3000
Health status (good/poor)	10/5			
Smoking status (smoker/non-smoker)	5/10			
Alcohol consumption (yes/no)	5/10			
Stress level (low/high)	10/5			
Sleep quality (good/poor)	10/5			
Depression score (0-10)	5.5	3.5	0	10
Anxiety score (0-10)	4.5	3.5	0	10
Life satisfaction (0-10)	6.5	3.5	0	10
Overall health (0-10)	7.5	3.5	0	10

5 a signaling gateway operable to receive a message
directed to a destination circuit;

10 a plurality of circuits comprising the destination circuit, each circuit coupled to at least one of the voice gateways, wherein the signaling gateway is operable to determine the destination voice gateway and to send the message to the destination voice gateway.

15 2. The system of claim 1, wherein:
 the destination voice gateway is associated with an
Internet protocol address; and

20 associate the destination circuit with the
Internet protocol address; and

25 3. The system of claim 1, further comprising a hash table associating a circuit with a voice gateway coupled to the circuit, wherein the signaling gateway is operable to determine the destination voice gateway by using the hash table.

4. The system of claim 1, further comprising a hash table associating the signaling gateway with the destination circuit, wherein the signaling gateway is operable to determine that the message is at the appropriate signaling gateway by using the hash table.

5. The system of claim 1, wherein:

the signaling gateway is operable to execute one or more message transfer parts, each message transfer part operable to direct the message to at least one of the voice gateways; and

at least one voice gateway is operable to execute an integrated services digital network user part, the integrated services digital network user part operable to provide signaling information to a circuit.

6. The system of claim 1, further comprising a message direction part operable to append a header to the message, the header comprising an address associated with the signaling gateway and a circuit identifier associated with the destination circuit.

7. The system of claim 6, wherein the header comprises a sender identifier identifying a sender of the message.

8. The system of claim 1, wherein the message comprises data information.

9. The system of claim 1, wherein the message comprises video information.

10. A method for transmitting a message in a communications network, the method comprising:

receiving a message at a signaling gateway coupled to a plurality of voice gateways, the message directed to a destination circuit;

determining a destination voice gateway coupled to the destination circuit, the voice gateways comprising the destination voice gateway; and

communicating the message to the destination voice gateway.

11. The method of claim 10, further comprising:

associating the destination circuit with an Internet protocol address identifying the destination voice gateway; and

communicating the message to the destination voice gateway by using the Internet protocol address.

12. The method of claim 10, further comprising:

associating a circuit with a voice gateway using a hash table, the circuit coupled to the voice gateway; and
determining the destination voice gateway by using the hash table.

13. The method of claim 10, further comprising:

associating the signaling gateway with the destination circuit using a hash table; and

determining that the message is at the appropriate signaling gateway by using the hash table.

14. The method of claim 10, further comprising:

executing one or more message transfer parts at the signaling gateway, the message transfer part operable to direct the message from the signaling gateway to at least one of the voice gateways; and

executing an integrated services digital network user part at a voice gateway, the integrated services digital network user part operable to provide signaling information to a circuit.

15. The method of claim 10, further comprising appending a header to the message, the header comprising an address associated with the signaling gateway and a circuit identifier associated with the destination circuit.

16. The method of claim 15, wherein the header comprises a sender identifier identifying a sender of the message.

17. The method of claim 10, wherein the message comprises data information.

18. The method of claim 10, wherein the message comprises video information.

19. A signaling gateway for transmitting a message in a communications network, the signaling gateway comprising:

a signaling software stack operable to:

5 receive a message directed to a destination circuit, and

determine a destination voice gateway operable to communicate the message to the destination circuit, the destination voice gateway one of a plurality of voice gateways coupled to the signaling gateway; and

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a message direction part operable to append a header to the message, the header comprising a voice gateway address identifying the destination voice gateway.

15 20. The signaling gateway of claim 19, wherein:
the destination voice gateway is associated with an Internet protocol address; and
the header comprises the Internet protocol address.

20 21. The signaling gateway of claim 19, further comprising a hash table associating a circuit with a voice gateway coupled to the circuit, wherein the signaling software stack is operable to determine the destination voice gateway by using the hash table.

25 22. The signaling gateway of claim 19, further comprising a hash table associating the signaling gateway with the destination circuit, wherein the signaling software stack is operable to determine that the message
30 is at the appropriate signaling gateway by using the hash table.

23. The signaling gateway of claim 19, wherein the header comprises a circuit identifier associated with the destination circuit.

5 24. The signaling gateway of claim 19, wherein the header comprises a sender identifier identifying a sender of the message.

25. The signaling gateway of claim 19, wherein the
10 message comprises data information.

26. The signaling gateway of claim 19, wherein the message comprises video information.

27. A system for transmitting a message in a communications network, the system comprising:

means for receiving a message at a signaling gateway coupled to a plurality of voice gateways, the message directed to a destination circuit;

means for determining a destination voice gateway coupled to the destination circuit, the voice gateways comprising the destination voice gateway; and

means for communicating the message to the destination voice gateway.

28. The system of claim 27, further comprising:

means for associating the destination circuit with an Internet protocol address identifying the destination voice gateway; and

means for communicating the message to the destination voice gateway by using the Internet protocol address.

29. The system of claim 27, further comprising:

means for associating a circuit with a voice gateway using a hash table, the circuit coupled to the voice gateway; and

means for determining the destination voice gateway by using the hash table.

30. The system of claim 27, further comprising:

means for associating the signaling gateway with the destination circuit using a hash table; and

means for determining that the message is at the appropriate signaling gateway by using the hash table.

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34. The system of claim 27, wherein the message comprises data information.

35. The system of claim 27, wherein the message comprises video information.

36. Signaling software embodied in a computer-readable medium and operable to perform the following:

receiving a message at a signaling gateway coupled to a plurality of voice gateways, the message directed to a destination circuit;

determining a destination voice gateway coupled to the destination circuit, the voice gateways comprising the destination voice gateway; and

communicating the message to the destination voice gateway.

37. The signaling software of claim 36, further operable to:

associate the destination circuit with an Internet protocol address identifying the destination voice gateway; and

communicate the message to the destination voice gateway by using the Internet protocol address.

38. The signaling software of claim 36, further operable to:

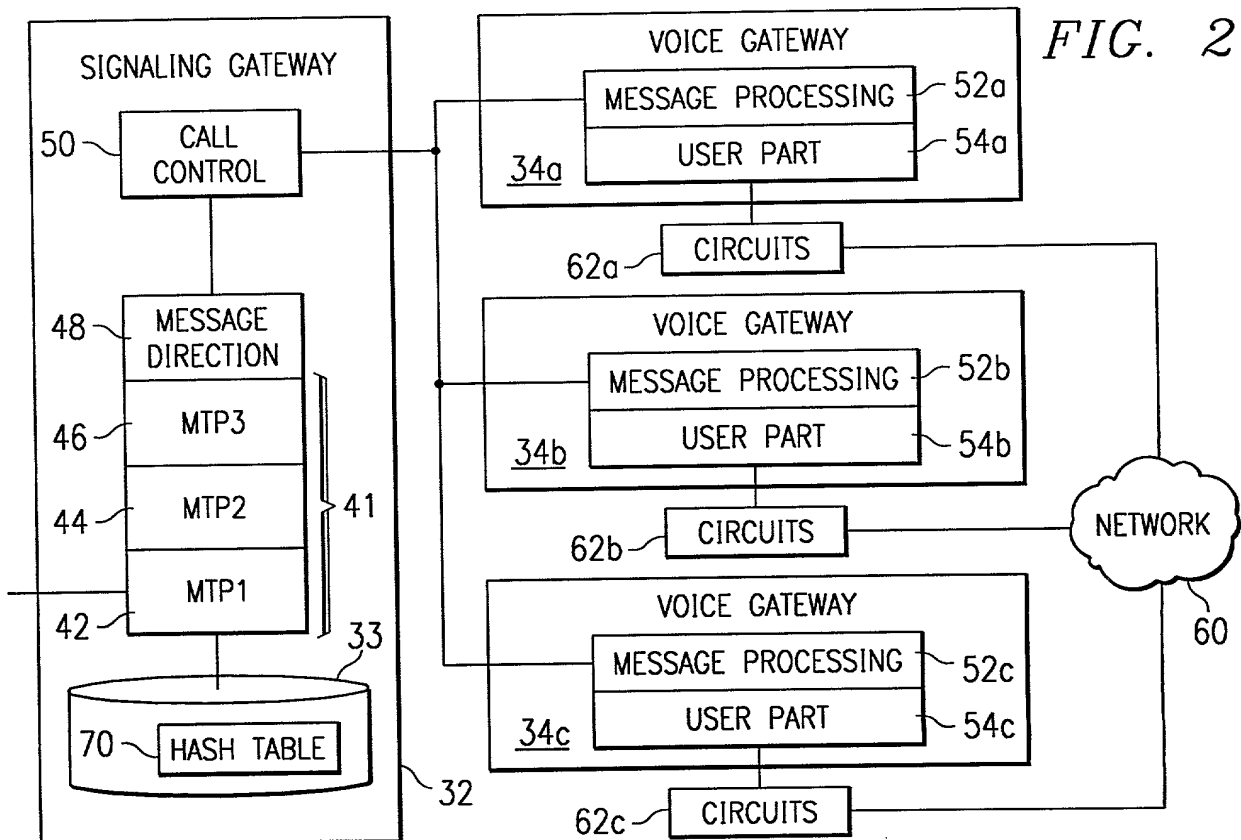
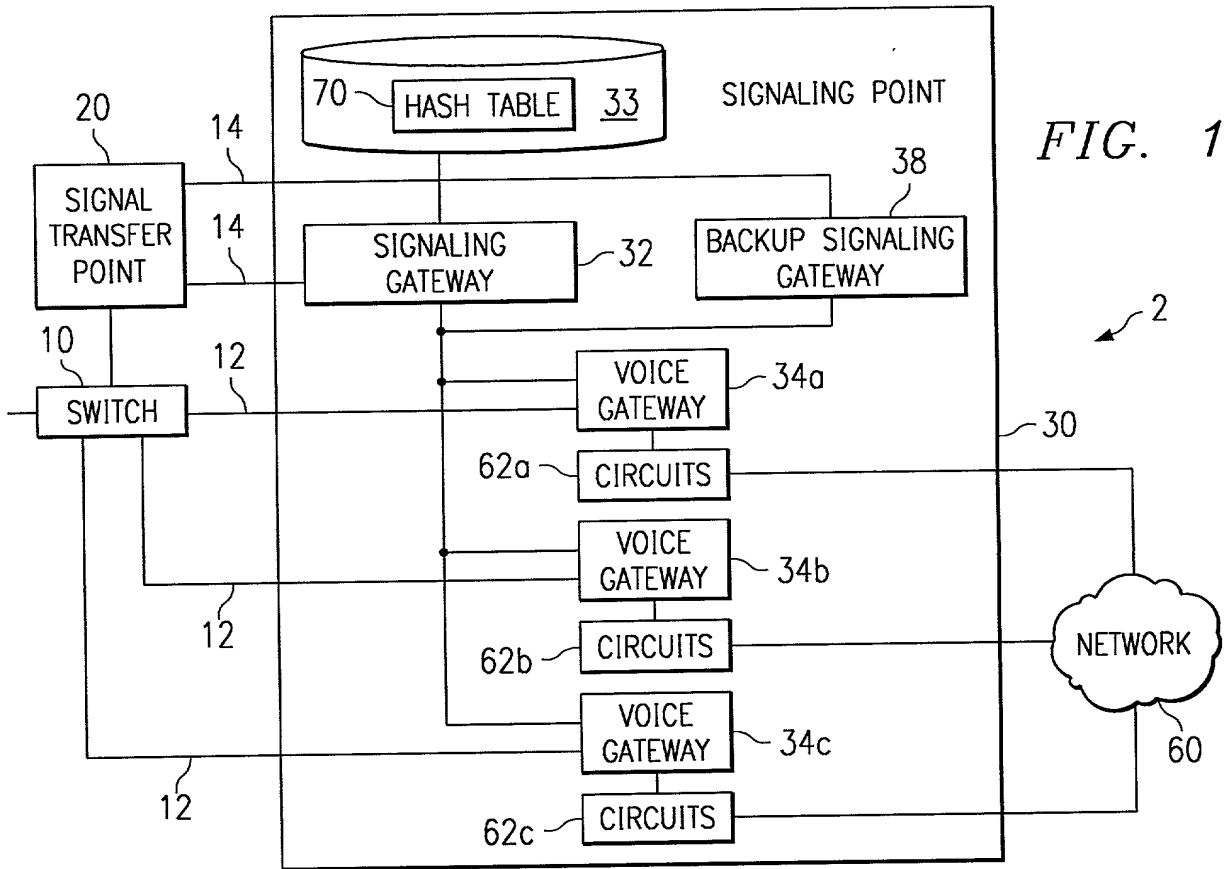
associate a circuit with a voice gateway using a hash table, the circuit coupled to the voice gateway; and

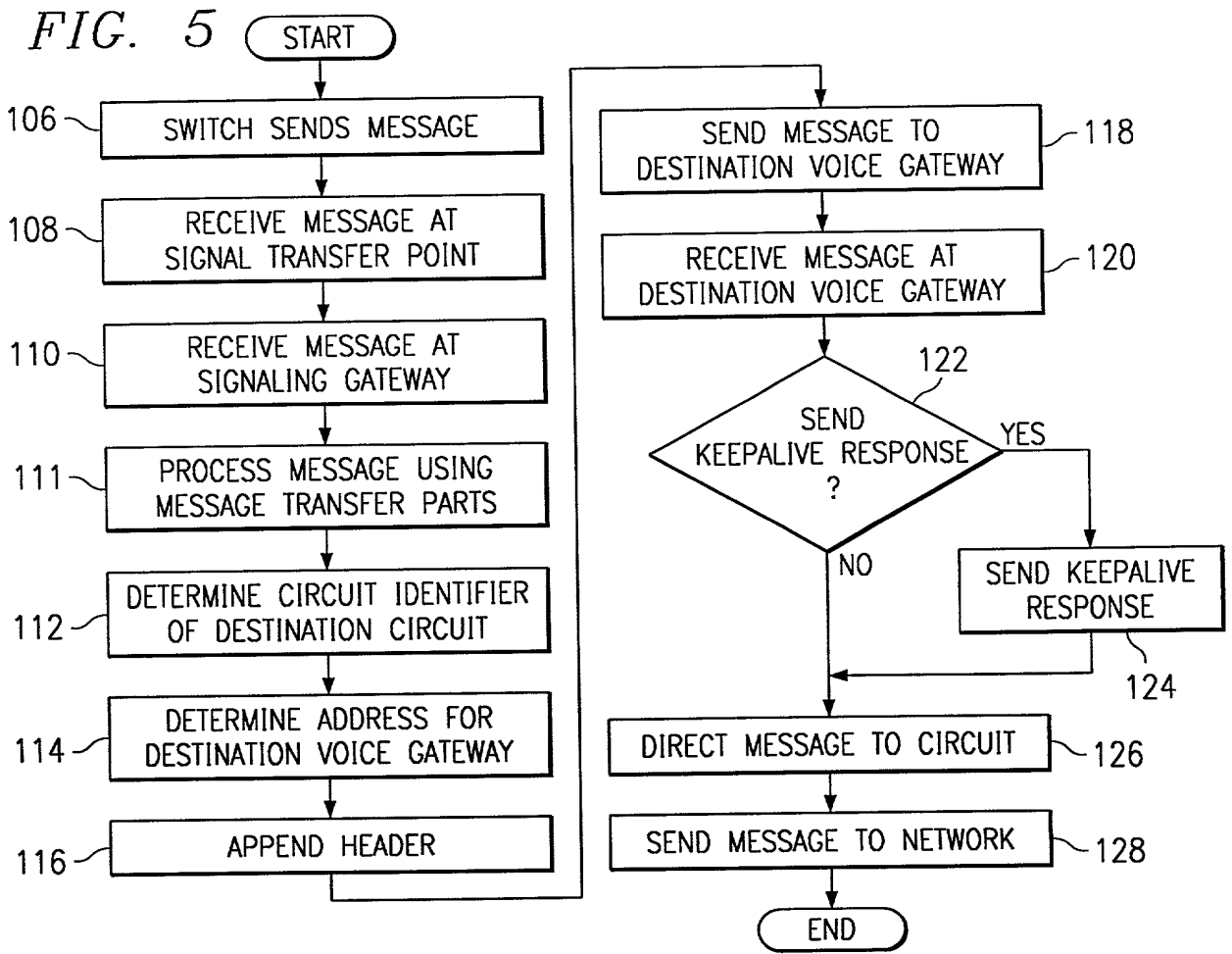
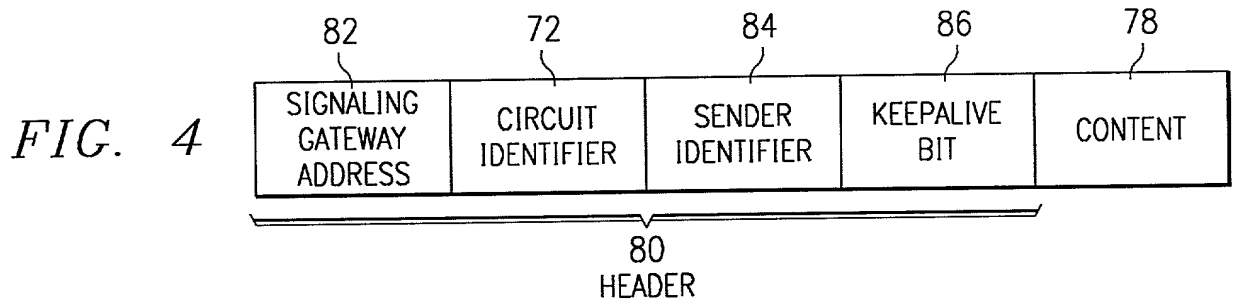
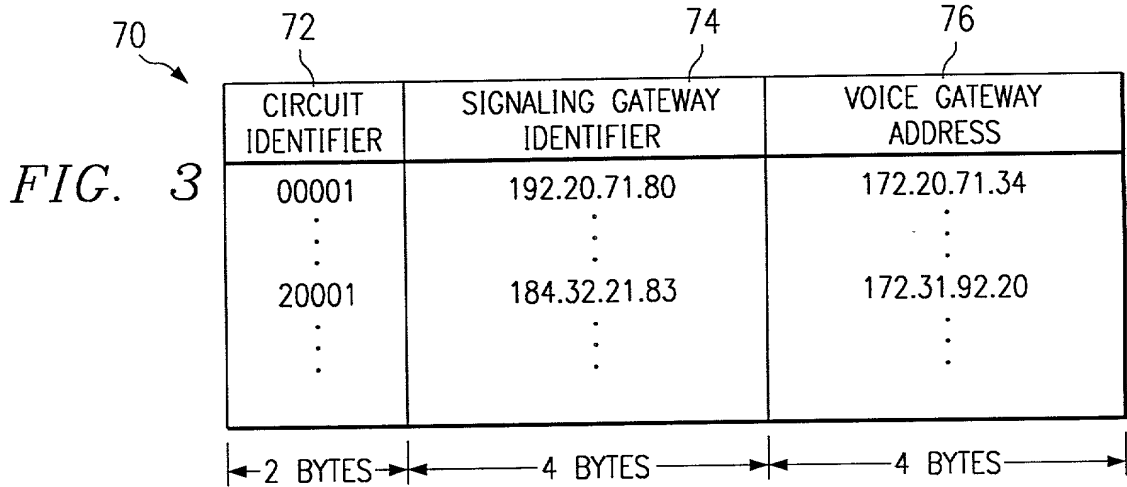
determine the destination voice gateway by using the hash table.

39. The signaling software of claim 36, further operable to:

associate the signaling gateway with the destination circuit using a hash table; and

determine that the message is at the appropriate signaling gateway by using the hash table.





DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name, that I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention, design or discovery entitled METHOD AND SYSTEM FOR TRANSMITTING MESSAGES IN A COMMUNICATIONS NETWORK, the specification of which is attached hereto;

That I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above; that I do not know and do not believe that said invention, design or discovery was ever known or used in the United States of America before my invention or discovery thereof, or patented or described in any printed publication in any country before my invention or discovery thereof, or more than one year prior to this application, or in public use or on sale in the United States of America more than one year prior to this application; that said invention, design or discovery has not been patented or made the subject of an inventor's certificate issued prior to the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns; and that I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application(s) for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Number	Country	Date Filed	Priority Claimed (Yes) (No)
-----NONE-----			

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application(s) in the manner provided by the first

paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. § 1.56 which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

<u>Application</u> <u>Serial Number</u>	<u>Date Filed</u>	<u>Status</u>
-----NONE-----		

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Full name of the sole or first inventor:

Thiyagesan (nmi) Ramalingam

Inventor's signature

Rohini

Date _____

10. 11. 2000

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